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SOF NATIONAL SCIENCE OLYMPIAD 2025-26

CLASS 10

QUESTION PAPER SET A

Total Questions : 50 | Time : 1 hr.

Guidelines for the Candidate

1. You will get additional ten minutes to fill up information about yourself on the OMR Sheet, before the start of the exam.
2. Write your **Name, School Code, Class, Section, Roll No.** and **Mobile Number** clearly on the **OMR Sheet** and do not forget to sign it. We will share your marks / result and other information related to SOF exams on your mobile number.
3. The Question Paper comprises three sections:
   Logical Reasoning (10 Questions), **Science** (35 Questions) and **Achievers Section** (5 Questions)
   Each question in Achievers Section carries 3 marks, whereas all other questions carry 1 mark each.
4. All questions are compulsory. There is no negative marking. Use of calculator is not permitted.
5. There is only ONE correct answer. Choose only ONE option for an answer.
6. To mark your choice of answers by darkening the circles on the OMR Sheet, use **HB Pencil** or **Blue / Black ball point pen** only. E.g.
   Q.16: If a mixture can be separated by magnetic separation, one of the constituents must be
   A. Ferrous B. Non-ferrous C. Precious D. Non-metallic.
   As the correct answer is option A, you must darken the circle corresponding to option A on the OMR Sheet.
   16. ● Ⓑ Ⓒ Ⓓ
7. Rough work should be done in the blank space provided in the booklet.
8. Return the OMR Sheet to the invigilator at the end of the exam.
9. Please fill in your personal details in the space provided before attempting the paper.
10. ***Participate in SOF-Techfest IIT Bombay Innovation Challenge. Open for class 8, 9 and 10. For details and to participate, please turn to last page.***

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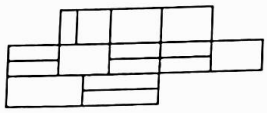
LOGICAL REASONING

1. Which of the following options will continue the given number series?

9876, 1645, 328, 81, 26, ?

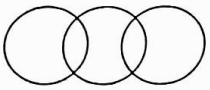
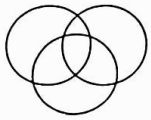
A. 13 B. 12 C. 14 D. 11

2. Find the number of rectangles formed in the given figure.



A. 30 B. 32
C. 33 D. More than 33

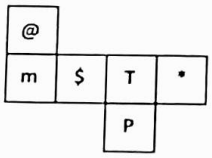
3. Which of following Venn diagrams best represents the relationship amongst, "Reptiles, Snakes and Lizards"?

A.
B.
C. 
D. 

4. How many such pairs of letters are there in the word 'LITHOSPHERE' each of which have as many letters between them as in the English alphabets?

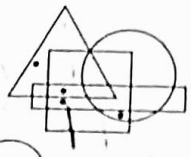
A. One B. Two
C. Three D. More than three

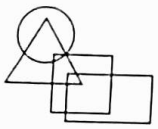
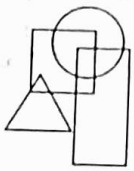
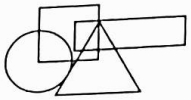
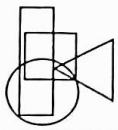
5. The given sheet of paper is folded to form a box. Select the box(es) from the options that is/are similar to the box so formed.



A. Only (ii)
B. Both (ii) and (iii)
C. Both (i) and (iii)
D. Both (i) and (ii)

6. Select a figure from the options which satisfies the same conditions of placement of the dots as in the given figure.



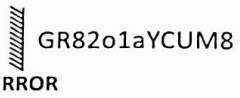
A. 
B. 
C. 
D. 

7. Seven persons J, K, L, M, N, O and P are sitting around a circular table facing opposite to the centre but not necessarily in the same order. O sits third to the right of J, who sits third to the right of N. L is an immediate neighbour of N. In anti-clockwise direction the number of persons sitting between O and K is one less than the number of persons sitting between K and J. P is not an immediate neighbour of L.

Who among the following sits second to the right of J?

A. P B. K C. L D. M

8. Select the correct mirror image of the given letters and numbers.

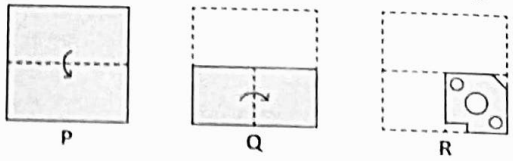


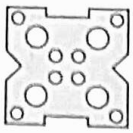
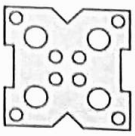
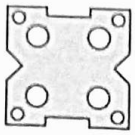
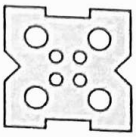
A. 8MUƆYɐIoZ8ꓤG B. RG28o1aYUC8M
C. ЄꓤZ8ƧoIϛʎCՈW8 D. R2G8o1aUY8MC

9. Pointing towards a lady, Arjun said, "She is the sister of my father's only nephew's mother." How is Arjun's sister related to that lady?

A. Daughter B. Niece
C. Aunt D. Data inadequate

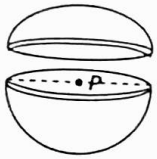
10. There is a set of three figures P, Q and R showing a sequence of folding of a piece of paper. Fig. R shows the manner in which the folded paper has been cut. Select the figure from the options which would most closely resemble the unfolded form of Fig. R.



A. 
B. 
C. 
D. 

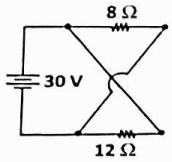
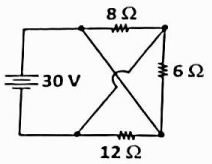
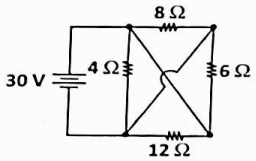
SCIENCE

11. A spherical shell is cut into two pieces along a chord. *P* is a point on the plane of the chord. The gravitational field at point *P* due to upper part is E_1 and due to lower part is E_2. What is the relation between E_1 and E_2?



A. $E_1 > E_2$ B. $E_1 = E_2$
C. $E_1 < E_2$ D. None of these

12. Column I shows arrangements of various resistances in circuit and column II shows the current supplied by the battery in each circuit. Match column I with column II and select the correct option from the given codes.

Column I		Column II	
P.		(i)	18.75 A
Q.		(ii)	6.25 A
R.		(iii)	11.25 A
		(iv)	9.24 A

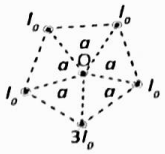
A. P - (ii), Q - (iii), R - (iv) B. P - (ii), Q - (i), R - (iii)
C. P - (ii), Q - (iii), R - (i) D. P - (iv), Q - (ii), R - (i)

13. Read the given paragraph and fill in the blanks by selecting an appropriate option.

If a particle is dropped from some height (taking initial velocity zero) then velocity-time graph of the particle is a (i) with (ii) slope. And its position-time graph will be a (iii). If the particle is projected vertically upward, the acceleration-time graph is a straight line parallel to (iv) axis.

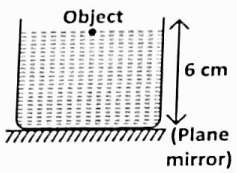
	(i)	(ii)	(iii)	(iv)
A.	Straight line	Positive	Parabola	Time
B.	Parabola	Negative	Straight line	Time
C.	Parabola	Positive	Parabola	Acceleration
D.	Straight line	Negative	Parabola	Acceleration

14. Five parallel infinite wires are placed at the vertices of a regular pentagon. Four wires carry current I_0 each while the fifth wire carries current $3I_0$ as shown in the figure. Determine the resultant magnetic field at the centre of pentagon.



A. Zero B. $\frac{\mu_0 I_0}{2\pi a}$ C. $\frac{\mu_0 I_0}{\pi a}$ D. Infinite

15. The given figure shows the position of plane mirror formed by polishing the bottom of the glass beaker that has water filled upto 6 cm. If a small object is floating on the surface of water, its image as seen from directly above the surface of water, is at a distance s from the surface. Find the approximate value of s if, refractive index of water is 1.33.



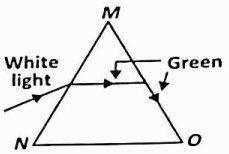
A. 7.5 cm B. 9.02 cm C. 8.8 cm D. 11 cm

16. Read the given statements carefully and select which of the given statements are correct about the sound wave?

(i) In sound wave propagation, density varies in the region of compressions and rarefactions.
(ii) Speed of sound depends on temperature.
(iii) The distance between a compression and a rarefaction is called wavelength.

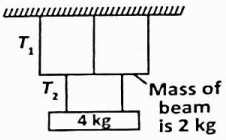
A. (ii) and (iii) only B. (i) and (ii) only
C. (i) and (iii) only D. (i), (ii) and (iii)

17. White light is incident on face MN of a glass prism. The path of the green component is shown in the given figure. If the green light is just totally internally reflected at face MO as shown, the light emerging from face MO will contain



A. Yellow, orange and red colours
B. Violet, indigo and blue colours
C. Yellow and blue colours
D. All colours except green.

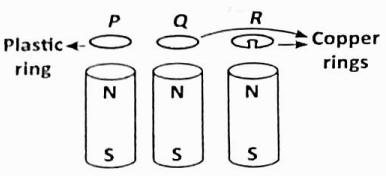
18. The figure represents a system of five strings and a beam of mass 2 kg holding a 4 kg mass. Regarding the given situation consider the following statements and select the option which correctly identifies them as true (T) and false (F) ones.



(i) The tension in the string, T_2 is 20 N.
(ii) For calculating the tension T_2 in the string, mass of the beam will be considered.
(iii) The tension in string, T_1 is 10 N.
(iv) It is not possible to calculate the value of tension T_1.

	(i)	(ii)	(iii)	(iv)
A.	T	T	F	F
B.	T	F	T	F
C.	T	F	F	F
D.	F	T	F	T

19. Three rings P, Q and R are dropped at the same time over identical hollow magnets as shown in the given figure.



Which of the following describes the order in which the rings P, Q and R reach the bottom of the magnet?

A. They arrive in the order P, Q, R.
B. They arrive in the order P, R, Q.
C. Rings P and R arrive simultaneously, followed by Q.
D. Rings Q and R arrive simultaneously, followed by P.

20. Read the given statements and select the correct option.

Statement 1: When a bullet is fired from a gun, then kinetic energy of the bullet is more than that of the gun.

Statement 2: Total work done by internal forces acting between the particles of a rigid body is always zero.

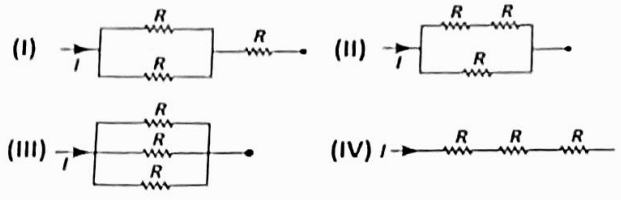
A. Both statement 1 and statement 2 are true and statement 2 is the correct explanation of statement 1.

B. Both statement 1 and statement 2 are true but statement 2 is not the correct explanation of statement 1.

C. Statement 1 is true but statement 2 is false.

D. Both statement 1 and statement 2 are false.

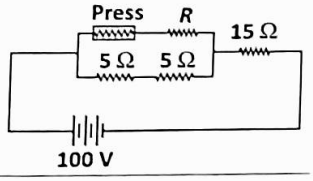
21. Different combinations of three resistors of equal resistance *R* are shown in the given figures. Arrange these in increasing order for power dissipation.



A. $P_{III} < P_{IV} < P_I < P_{II}$ B. $P_I < P_{II} < P_{III} < P_{IV}$

C. $P_{II} < P_{III} < P_{IV} < P_I$ D. $P_{III} < P_{II} < P_I < P_{IV}$

22. A heating press is designed to operate with a power of 1000 W in a line of 100 V. It is connected to a combination of resistance *R*, 5 Ω, 5 Ω and 15 Ω and to a 100 V main supply as shown in the given figure. Find the value of *R* so that the entire circuit operates with a power of 460 W.



A. 10.66 Ω

B. 20.4 Ω

C. 14.5 Ω

D. 38.8 Ω

23. Read the given statements carefully and select the correct option.

Statement 1: When barium chloride solution is added to sodium sulphate solution then a white precipitate of barium sulphate is formed along with sodium chloride solution.

Statement 2: Barium sulphate is formed by a single displacement reaction and since it is insoluble in water, it separates as a white precipitate.

A. Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.

B. Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.

C. Statement 1 is true but statement 2 is false.

D. Both statements 1 and 2 are false.

24. Select the correct statement regarding change of state of matter.

A. The melting point of a solid is an indication of the strength of the forces of attraction between its particles.

B. The direct change of solid to gas without changing into liquid is called deposition.

C. Applying pressure and increasing the temperature can liquefy gases.

D. Boiling is a bulk phenomenon. Particles from the bulk of the liquid lose energy to change into the vapour state.

25. Which of the following is/are not correctly matched?

	Compound	Nature of salt	pH range
I.	NH_4Cl	Basic salt	> 7
II.	NaCl	Neutral salt	≈ 7
III.	CH_3COONa	Acidic salt	< 7
IV.	Na_2CO_3	Neutral salt	≈ 7

A. I and III only B. II and IV only

C. I only D. I, III and IV only

26. An element *X* forms a nitride with formula *X*N. What will be the formula for its sulphite?

A. X_2SO_4 B. X_2SO_3 C. $X_2(SO_4)_3$ D. $X_2(SO_3)_3$

27. A white powder '*X*' is added to dilute HCl solution. It is observed that a colourless, odourless gas is evolved that turns lime water milky. The evolved gas extinguishes a burning splinter. Identify '*X*'.

A. Na_2SO_4 B. NH_4Cl C. $CaCl_2$ D. Na_2CO_3

28. A brief information about three substances is given in the table.

Substance	Melting point	Boiling point
X	20°C	60°C
Y	5°C	20°C
Z	70°C	110°C

Which of the following is incorrect about these substances?

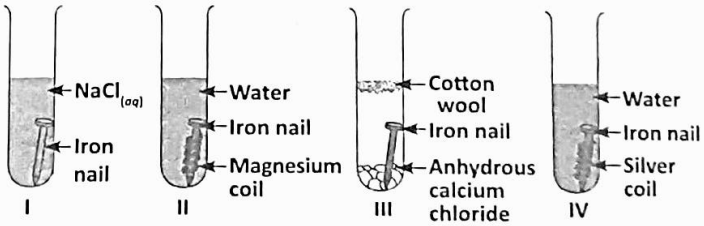
A. At 35°C, substance *X* will have fixed volume but no fixed shape.

B. At 40°C, substance *Y* will have maximum space between the particles.

C. At 30°C, substance *Z* will have strongest interparticle forces.

D. None of these

29. Observe the given figures.



Which of the given observations are correct?

Test tube	Observation
I	Iron nail rusted
II	No rusting
III	Iron nail rusted
IV	No rusting

A. II and III only
B. I and IV only
C. I and II only
D. III and IV only

30. Find the correct matches.

I.	Aerosol	-	Mist
II.	Gel	-	Face cream
III.	Emulsion	-	Cheese
IV.	Sol	-	Milk of magnesia

A. II and IV
B. I and IV
C. I and III
D. II and III

31. Match column I with column II and select the correct option from the given codes.

	Column I		Column II
I.	Electrolytic refining	(p)	Mercury
II.	Reduction with coke	(q)	Aluminium
III.	Thermit process	(r)	Lead
IV.	By heating alone	(s)	Copper

	I	II	III	IV
A.	p	r	q	s
B.	q	r	s	p
C.	r	q	s	p
D.	s	r	q	p

32. In which of the following reactions a gas is evolved which turns lime water milky?

I. $CH_3COOC_2H_5 + NaOH \rightarrow$

II. $CH_4 + 2O_2 \rightarrow$

III. $CH_2{=}CH_2 + H_2 \xrightarrow[\text{Heat}]{\text{Ni catalyst}}$

IV. $CH_3COOH + Na_2CO_3 \rightarrow$

A. II and III only
B. II and IV only
C. I, II and IV only
D. I and II only

33. Description of few atoms/ions is given in the table:

Atom/Ion	P	Q	R	S
No. of protons	17	17	20	18
No. of neutrons	18	19	20	22
No. of electrons	17	17	20	18

Identify the pair of isotopes and isobars.

	Pair of isotopes	Pair of isobars
A.	P, S	Q, R
B.	R, S	P, Q
C.	P, R	Q, S
D.	P, Q	R, S

34. Consider the following reaction and select the incorrect statements.

$$\underset{(C_2H_4)}{P} + Br_2 \xrightarrow{CCl_4} Q$$

I. In this reaction colour of bromine changes from blue to colourless.

II. The reaction is used to distinguish between unsaturated and saturated hydrocarbons.

III. This reaction is an example of substitution reaction.

IV. The molecular formula of *Q* is $C_2H_6Br_2$.

A. I and III only
B. II and IV only
C. I, II and III only
D. I, III and IV only

35. Why did Mendel choose pea plant as a model for his experiments?

A. Pea plants bear unisexual flowers having both male and female parts.

B. In pea plants, structure of the flower is such that it exposes the stigma properly, ensuring cross pollination.

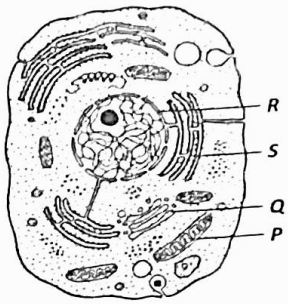
C. In pea plants, due to self fertilisation, it is easy to get pure lines for several generations.

D. Pea plants have a long life cycle, which makes it possible to study a particular plant for many days.

36. Select the incorrect match.

	Event		Type of movement
A.	Opening and closing of tulip flowers	–	Thermonastic
B.	Drooping of *Mimosa* leaves when touched	–	Thigmonastic
C.	Coiling of *Cucurbita* tendrils around a support	–	Geotropism
D.	Closing of dandelion flowers at night	–	Photonastic

37. Refer to the given figure showing basic structure of a cell. Identify *P* - *S* and select the correct statement regarding them.



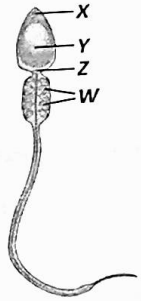
A. A mature mammalian RBC lacks *P* and *R* but contains *Q* and *S*.

B. *P* is called the power house of the cell as it releases energy in form of ATP through cellular respiration.

C. In a prokaryotic cell, *R* is present but *P*, *Q* and *S* are absent.

D. *S* gives rise to acrosome in an animal sperm.

38. Refer to the given figure and select the option that correctly identifies *W*, *X*, *Y* and *Z*.



	W	X	Y	Z
A.	Mitochondria	Cytoplasm	Lysosome	Nucleus
B.	Golgi complex	Basal body	Nucleus	Mitochondria
C.	Lysosome	Nucleus	Acrosome	Basal body
D.	Mitochondria	Acrosome	Nucleus	Basal body

Secondary - 9oc

39. The given organisms are grouped on the basis of their mode of nutrition. Select the option that contains an odd member.

A. Frog, Snake, Lion
B. China rose, Mustard, Mango
C. Mushroom, Bread mould, *Amoeba*
D. Head louse, Tapeworm, Bedbug

40. Read the given statements and select the option that correctly identifies them as true (T) or false (F) ones.

(i) The process of qualitative changes in the cells to perform different functions in living organisms is called differentiation.
(ii) The growth of roots in onion bulb is due to the activity of intercalary meristem.
(iii) Phloem is considered as living conducting tissue.
(iv) Cilia are hair-like structures present in ciliated epithelium and each cell has one cilium arising from a basal granule.

	(i)	(ii)	(iii)	(iv)
A.	T	F	T	F
B.	F	T	F	F
C.	F	F	T	F
D.	F	F	F	T

41. Select the incorrect matches.

(i) Haversian system – Bones
(ii) Yellow elastin fibres – Tendons
(iii) Chondrocytes – Cartilage
(iv) Intercalated discs – Ligaments
(v) Nissl's granules – Neuron

A. (i), (ii) and (iii) only
B. (ii) and (v) only
C. (ii) and (iv) only
D. (i), (iv) and (v) only

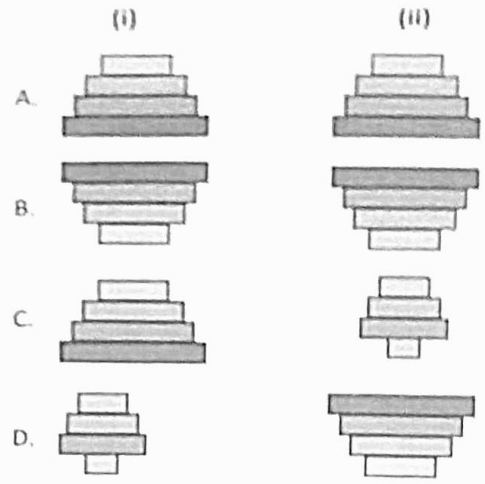
42. A monohybrid cross was made between a homozygous tall plant and a homozygous dwarf plant. What will be the percentage of heterozygous tall plants in the F_2 generation?

A. 100% B. 25% C. 50% D. 75%

43. Refer to the given food chain and select the option that correctly answers the questions that follows.

Grass → Insect → Sparrow → Eagle

(i) What will be the shape of pyramid of number for this food chain?
(ii) What will be the shape of pyramid of number if grass is replaced by banyan tree?



44. Worker honey bees secrete a yellowish-brown by-product called *X* from their special gland that is used in the construction of hive.

Identify *X* and select the correct statement regarding it.

A. *X* is propolis that is used in manufacturing of face creams.
B. *X* is bee glue that is fed to the larvae.
C. *X* is beeswax that is used for manufacturing face creams, paints, candles, etc.
D. *X* is bee venom that is also used as a blood purifier.

45. Read the given statements and select the correct option.

Statement 1 : Mitochondria can synthesise their own proteins.
Statement 2 : Mitochondria have their own DNA, RNA, ribosomes and enzymes.

A. Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
B. Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
C. Statement 1 is true but statement 2 is false.
D. Both statements 1 and 2 are false.

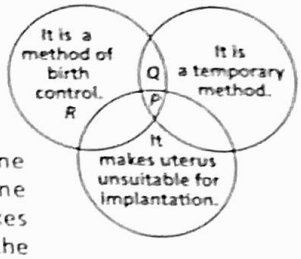
ACHIEVERS SECTION

46. Identify *X* and *Y* in the given figure of human brain and select the incorrect pair(s) of differences about them in the given table.

S.No.	*X*	*Y*
(i)	It coordinates muscular activity.	It is the seat of intelligence and memory.
(ii)	It has two cavities called lateral ventricles.	Cavity is nearly absent.
(iii)	It constitutes 12.5% of the brain.	It constitutes 80% of the brain.
(iv)	It consists of three parts.	It consists of two parts.

A. (i) and (ii) only
B. (ii) only
C. (ii) and (iii) only
D. (i), (iii) and (iv) only

47. Refer to the given Venn diagram. Identify *P*, *Q* and *R* and select the incorrect statement regarding them.



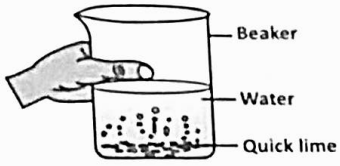
A. *P* could be a hormone releasing intrauterine device that also makes the cervix hostile to the sperms.

B. *Q* could be a condom or a diaphragm that prevents conception by blocking the entry of sperms through the cervix.

C. *R* could be vasectomy or tubectomy which involves sterilisation and provides a permanent and sure birth control.

D. None of these

48. Observe the given experimental set-up carefully.



Select the incorrect statements from the following.

I. In this reaction a coloured solid compound PbO is obtained as a residue.

II. When the product of this reaction is further mixed with water, a suspension called milk of magnesia is obtained.

III. White fumes of NO_2 are evolved during the reaction.

IV. The product formed in this reaction, reacts slowly with the carbon dioxide in air to form a thin layer of calcium carbonate on the walls.

V. In this reaction, slaked lime is obtained as a product.

VI. This reaction is an example of endothermic, redox as well as decomposition reaction.

A. I, II and IV only
B. II, III, IV and VI only
C. I, II, III and VI only
D. I, III and V only

49. Consider the following four experimental set-ups.

Set-up I: A clean copper wire is immersed in an aqueous solution of zinc sulphate.

Set-up II: An iron strip is dipped into a solution of copper sulphate.

Set-up III: A silver strip is placed in an aqueous solution of copper(II) nitrate.

Set-up IV: Lead granules are added to a solution of calcium chloride.

Analyse the statements given below and choose the correct option.

P. Copper fails to displace zinc in set-up I because it is less reactive.

Q. In set-up II, iron displaces copper from copper sulphate, forming iron(II) sulphate.

R. A brown layer of copper gets deposited on silver in set-up III.

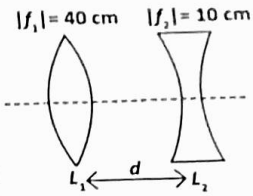
S. Lead displaces calcium from calcium chloride in set-up IV due to its heavier atomic mass.

T. Only set-up II shows a visible change.

U. In set-up III, reaction involves redox changes with silver acting as the reducing agent.

A. Only statements P, Q and R are correct.
B. Only statements P, Q and T are correct.
C. Only statements Q, S and U are correct.
D. Only statements Q and T are correct.

50. Consider a system of two lenses having focal length f_1 and f_2. The lenses are separated by a distance *d* as shown in the given figure. Now, match column I with column II and select correct option from given codes.



Column I	Column II
P. If a parallel beam of light is incident on L_1, then the value of *d* such that the rays after refraction from L_1 and L_2 passes undeviated, is	(i) 10 cm
Q. If a converging beam is incident on L_2, then among given values, the minimum value of *d*, such that the final image is formed at a distance of 40 cm, left of L_1, is	(ii) 30 cm
R. If d = 20 cm, an object is placed at 40 cm left of L_1, then distance of the final image from L_2 is	(iii) 5 cm

A. P - (iii), Q - (ii), R - (i)
B. P - (ii), Q - (iii), R - (i)
C. P - (ii), Q - (i), R - (iii)
D. P - (i), Q - (iii), R - (ii)

SPACE FOR ROUGH WORK

SOF & Techfest PRESENTS

INNOVATION CHALLENGE

FOR CLASSES 8, 9 & 10

SOF-TECHFEST IIT BOMBAY INNOVATION CHALLENGE

Introduction

Techfest is Asia's Largest Science and Technology Festival and the Annual Science and Technology Festival of IIT Bombay. With the sole motto of nurturing young talent and promoting innovative thinking among school students, Techfest is conducting an Innovation Challenge in association with the Science Olympiad Foundation for school students across India. It is a platform for young visionaries and problem solvers to showcase their creativity, ingenuity and technical prowess.

Guidelines:

- Appearing in the Innovation Challenge is not compulsory. In case you wish, please visit www.techfest.org/innovationchallenge. No registration fee is to be paid.
- To participate, read the following problem statement and submit your answer at the given link: https://sofworld.org/sof-techfest-iit-bombay-innovation-challenge-form
- Answers should be submitted as per the following schedule:

NSO Set-A 13th November	NSO Set-B 27th November	NSO Set-C 11th December
By 20th November	By 4th December	By 15th December

PROBLEM STATEMENT

Innovation for Real-World Challenges – Technology & Creativity for a Better Tomorrow

As we move into a rapidly changing world, students face many real-life challenges in their schools, neighbourhoods and communities. From health and safety to inclusivity and accessibility, innovation and technology can play a key role in improving daily life. Choose **ONE** of the following pressing challenges and propose a creative, technology-driven solution:

1. **Inclusive Learning for All –** How can we design innovative and affordable solutions that make learning more inclusive whether by supporting students with disabilities, bridging the digital divide, or creating smarter classrooms that cater to different learning needs?
2. **Traffic & Mobility –** Urban traffic causes delays, fuel waste and pollution. What innovative solution can make daily transportation safer, faster and eco-friendlier for students and citizens?
3. **Every Drop Counts –** With water scarcity increasing, how can schools and communities use technology to reduce wastage and manage water efficiently?

Format for Students:

- **Title –** Title of your chosen challenge.
- **Problem –** Clearly explain the social challenge and its impact (100–150 words).
- **Solution –** Present an innovative, feasible idea using technology or creative design (150–200 words).
- **Conclusion –** Justify why your solution is impactful and how it can be implemented (50–100 words).

Rewards:

- Each participant will be awarded a Certificate of Participation from SOF-Techfest, IIT Bombay.
- Top 20 students will be invited with an accompanying adult to Techfest 2025-26 from 22nd to 24th December, 2025, with accommodation provided by Techfest, IIT Bombay.
- Winners will be awarded trophies, gifts, certificates and will get a chance of exclusive VIP entry to International Exhibitions and Lectures at Techfest, IIT Bombay, along with an opportunity to visit IIT Bombay's campus.

Techfest

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